

## CLAIMS

What is claimed is:

1. A cathode head suitable for use in an x-ray device that includes an anode having a target surface configured and arranged to receive electrons emitted by the cathode head so as to generate x-rays, the cathode head comprising:

an emitter block;

an emitter attached to the emitter block and configured to generate an electron beam that defines a focal spot on the target surface of the anode; and

at least one magnetic element disposed proximate the emitter.

2. The cathode head as recited in claim 1, wherein the at least one magnetic element comprises at least one electromagnet.

3. The cathode head as recited in claim 1, wherein the at least one magnetic element comprises at least one permanent magnet.

4. The cathode head as recited in claim 1, wherein the emitter block is substantially non-magnetic.

5. The cathode head as recited in claim 1, wherein the emitter block is magnetic.

6. The cathode head as recited in claim 1, wherein the emitter defines a longitudinal axis about which the at least one magnetic element is disposed.

7. The cathode head as recited in claim 1, wherein the at least one magnetic element comprises a pair of electromagnets.

8. The cathode head as recited in claim 1, wherein the at least one magnetic element and the emitter block cooperate to create a magnetic field through which at least a portion of the electron beam passes.

9. The cathode head as recited in claim 1, wherein the emitter comprises at least one filament.

WORKMAN NYDEGGER  
A PROFESSIONAL CORPORATION  
ATTORNEYS AT LAW  
1000 EAGLE GATE TOWER  
60 EAST SOUTH TEMPLE  
SALT LAKE CITY, UTAH 84111

10. A cathode head suitable for use in an x-ray device that includes an anode having a target surface configured and arranged to receive electrons emitted by the cathode head, the cathode head comprising:

an emitter block;

an emitter attached to the emitter block and configured to generate an electron beam that defines a focal spot on the target surface of the anode; and

means for facilitating focal spot control.

11. The cathode head as recited in claim 10, wherein the means for facilitating focal spot control serves to adjust the position of the focal spot on the target surface.

12. The cathode head as recited in claim 10, wherein the means for facilitating focal spot control enables at least lateral adjustments to the position of the focal spot on the target surface.

13. The cathode head as recited in claim 10, wherein the means for facilitating focal spot control employs a magnetic field to adjust the position of the focal spot on the target surface.

14. The cathode head as recited in claim 13, wherein the magnetic field is substantially perpendicular to the electron beam.

15. The cathode head as recited in claim 10, wherein the means for facilitating focal spot control implements an adjustable deflection of the electron beam.

16. The cathode head as recited in claim 10, wherein the means for facilitating focal spot control acts on the electron beam in a location proximate the emitter.

17. The cathode head as recited in claim 10, wherein the emitter block is substantially non-magnetic.

18. The cathode head as recited in claim 10, wherein the emitter block is magnetic.

19. The cathode head as recited in claim 10, wherein the means for facilitating focal spot control cooperates with the emitter block to create a magnetic field through which at least a portion of the electron beam passes.

WORKMAN NYDEGGER  
A PROFESSIONAL CORPORATION  
ATTORNEYS AT LAW  
1000 EAGLE GATE TOWER  
60 EAST SOUTH TEMPLE  
SALT LAKE CITY, UTAH 84111

20. An x-ray device, comprising:
- a vacuum enclosure;
  - an anode substantially disposed within the vacuum enclosure, the anode including a target surface; and
  - a cathode head substantially disposed within the vacuum enclosure and comprising:
    - an emitter block;
    - an emitter attached to the emitter block and configured to generate an electron beam that defines a focal spot on the target surface of the anode; and
    - at least one magnetic element disposed proximate the emitter.

21. The x-ray device as recited in claim 20, wherein the at least one magnetic element comprises a pair of electromagnets.

22. The x-ray device as recited in claim 20, wherein the at least one magnetic element comprises a permanent magnet.

23. The x-ray device as recited in claim 20, wherein the emitter block is substantially non-magnetic.

24. The x-ray device as recited in claim 20, wherein the emitter block is magnetic.

25. The x-ray device as recited in claim 20, wherein the emitter defines a longitudinal axis about which the at least one magnetic element is disposed.

26. The x-ray device as recited in claim 20, wherein the at least one magnetic element and the emitter block cooperate to create a magnetic field through which at least a portion of the electron beam passes.

27. The x-ray device as recited in claim 20, wherein the anode is a rotating anode.

28. The x-ray device as recited in claim 20, wherein the anode is a stationary anode.

WORKMAN NYDEGGER  
A PROFESSIONAL CORPORATION  
ATTORNEYS AT LAW  
1000 EAGLE GATE TOWER  
60 EAST SOUTH TEMPLE  
SALT LAKE CITY, UTAH 84111

29. A cathode head suitable for use in an x-ray device that includes a vacuum enclosure within which is disposed an anode having a target surface configured and arranged to receive electrons emitted by the cathode head, the cathode head being substantially disposed within the vacuum enclosure and comprising:

an emitter block;

a filament attached to the emitter block and defining a longitudinal axis, the filament being configured to emit an electron beam that defines a focal spot on the target surface of the anode; and

at least one electromagnet attached to the emitter block and disposed about the longitudinal axis defined by the filament.

30. The cathode head as recited in claim 29, wherein the emitter block is substantially non-magnetic.

31. The cathode head as recited in claim 29, wherein the emitter block is magnetic.

32. The cathode head as recited in claim 29, wherein the at least one electromagnet comprises a pair of electromagnets.